

Amendments to the Specification:

Please replace paragraph [0003] with the following amended paragraph:

[0003] Traditional methods of automatic image cropping are often ineffective because they require further manipulation of the image by the user. In particular, these existing cropping methods ignore the orientation issue, and only attempt to address only the border removal issue. Such methods yield a final image that remains improperly oriented and, as a result, an image that still contains undesirable border or that has been overly cropped. Thus, the value of traditional methods to the user is considerably less than that of an automated method that consistently produces properly oriented and cropped images.

Please replace paragraph [0008] with the following amended paragraph:

[0008] In accordance with yet another aspect of the invention, a system for processing an image. The image includes at least a plurality of pixels, and each of the pixels ~~each~~ has a value representative of an optical characteristic of a scanned object. The system stores computer-executable instructions to identify a plurality of pixels along at least one edge portion of the image as a function of the pixel values. The system also stores computer-executable instructions to define one or more edges of the image from the identified pixels. The system also stores computer-executable instructions to determine an orientation of the image relative to a target orientation as a function of the defined edges. The system also stores computer-executable instructions to adjust the orientation of the image portion to correspond to the target orientation. The system further stores computer-executable instructions to cropping the adjusted image to eliminate the border portion.

Please replace paragraph [0018] with the following amended paragraph:

[0018] FIG. 4D illustrates a generated outline of the digital image.

3

MS#305263.01 (5078)
PATENT

Please replace paragraph [0020] with the following amended paragraph:

[0020] FIG. 4G is an exemplary screen shot illustrating digital image produced according to the present invention.

Please replace paragraph [0030] with the following amended paragraph:

[0030] Referring next to FIG. 2, an exemplary screen shot of a digital image 200 obtained from a scanning process is shown. The digital image 200 comprises a border portion 202 and an image portion 204. The border portion 202 has a generally rectangular periphery, and includes top and bottom sides that are substantially parallel to a horizontal axis, and includes right and left sides that are substantially parallel to a vertical axis. Those skilled in the art will recognize that the border portion 202 is a generally uniform color such as white or black. The image portion 204 is surrounded by the border portion 202, and has a shape that corresponds to the shape of the scanned document. The image portion 204 generally includes a plurality of colors or a plurality of shades. Although the image portion is illustrated in FIG. 2 as having a generally rectangular shape, as is typically the case for imported or scanned images, it is to be understood that the invention could be used for adjusting an image portion having any shape. As can be seen from FIG. 2, the image portion 204 may be crooked (i.e., not level) with respect to horizontal or vertical axes. As described above, the photograph or drawing may have been placed on a flatbed scanner slightly crooked so that the edges of the scanned photograph are not perfectly horizontal and vertical with respect to reference axes. Moreover, there may be unwanted or extra border around the image portion. For instance, the extra border portion 202 may result from scanning a document such as a slide having that has an extra white space around it. However, the user typically prefers viewing, posting to the web, or printing a hard copy of a digital image 200 without the border portion 202, and with the image portion 204 leveled or correctly oriented.

Please replace paragraph [0033] with the following amended paragraph:

[0033] Identifying instructions 402 include instructions for identifying the corners of the image portion 403 of the digital image 401. In one embodiment, identifying instructions 402 include instructions for defining four processing lines 404, 406, 408, and 410 that are aligned diagonally (e.g., 45 degree angle) relative to a target orientation. In this case, the target orientation

corresponds to horizontal axis 412, or vertical axis 414 such as shown in FIG. 4B. The diagonal processing lines 404, 406, 408, and 410 are each defined to have an initial position that corresponds to a different corner of the border portion 411 (e.g., each processing line is tangentially aligned to a different corner). The identifying instructions 402 further include instructions for repositioning each of the diagonal processing lines a predetermined distance toward a center of the target orientation until each of the processing lines intersects one of the pixels having a pixel value substantially different than previously processed pixels. In this example, the center of the target orientation corresponds to the intersection of the horizontal and vertical axes 412, 414. As can be seen from the screen shot illustrated in FIG. 4B, the imaginary diagonal lines will each first contact (i.e., intersect) one of the four corners of the digital image. The identifying instructions 402 also include instructions for recording in a memory (e.g., memory 108) the location of the first pixel intersected by each of the processing lines having a pixel value substantially different than previously processed pixels. For example, in the case of an image having pixels with a single bit depth, pixels in the border portion 411 will have a pixel value of 1 (i.e., white), and pixels in the image portion 403 will have a pixel value of 0 (i.e., black).

Please replace paragraph [0035] with the following amended paragraph:

[0035] In another embodiment, identifying instructions 402 include instructions for applying an "edge detection filter" to the original image. More specifically, identifying instructions 402 include instructions for applying an edge detection filter such as a Laplacian filter to process the digital image to distinguish the border portion 411 from the image portion 403 of the document. In some cases, the border portion 411 is not perfectly uniform in color. For example, if the scanning surface is not clean during the scanning process, the border portion 411 may include non-border colors that represent the unclean portions of the scanning surface. However, because an edge detection filter detects significant color transitions in the digital image (i.e., edges), such random color deviations in the border portion 411 of the digital image can be easily distinguished from the edges. As known to those skilled in the art, an edge detection filter works by superimposing a matrix such as shown in FIG. 4H over each of the pixels of the digital image, and applying a mathematical operation to each pixel to produce a new set of pixels. In the case of the filter shown in FIG. 4H, the brightness of each pixel value of the digital image along with the twelve closest neighboring pixels is multiplied by the values shown in the matrix and the

results added together to create new pixels with new brightness values. [[.]]The effect of the example filter is to produce areas of blackness where the original image doesn't change much (i.e., it exhibits near-continuous tones) and areas of whiteness where significant changes in brightness are occurring (i.e., at edges). As a result of processing the image with this filter, the transition points (i.e., the edges of the image portion) from the border portion 411 to the image portion 403 are easily identified.